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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,923	02/25/2005	Leonid B. Rubin	DFEI-1-1001	2805

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EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 08/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/525,923

Applicant(s)

RUBIN ET AL.

Examiner

Jeffrey T. Barton

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 6, 7 and 9-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20050718.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, Species A (Claims 1-5 and 8) in the reply filed on 24 July 2006 is acknowledged. The traversal is on the ground(s) that the inventions claimed in claims 1 and 2 are not rendered obvious by the prior art. Specifically, Applicant argues distinction between the respective teachings in that: the instant claims require a film, not the plate disclosed by Little; the claims require the wires to be embedded in an adhesive, not the film itself; and the distinction between the electrostatic bonding of Little and the adhesive layer of the claims. This is not found persuasive because: (a) there is no structure recited to distinguish the claimed "film" from the plate 34 of Little- a thick "film" reads on a "plate", and a thin "plate" reads on a "film"; (b) within the interpretation of the Examiner, the wires of Little are embedded in the softened antireflective coating on the interior face of plate 34 - this layer acts as an adhesive layer; and (c) the Examiner stated it would have been obvious to use a solder coating to connect the wires (24) to busbar (27), not to connect the grid to the cell - no modification to the electrostatic bonding of Little et al was suggested, and Applicant provided no rebuttal to the argument of the obviousness of such connection, which the Examiner still deems obvious. Applicant also argues that EP 0 807 980 A2 does not disclose the provision of solder as a layer or cladding on the wires. The Examiner points out that the claim language only requires the presence of the alloy on a part of the surfaces protruding from the adhesive layers. Individual connections made by

solder read on such a coating - there is no requirement that the alloy cover the entire surface protruding from the adhesive.

Regarding Applicant's contention that no serious burden would be involved in the search of all claims, the Examiner points out that claims to electrodes require a significantly different search than claims to a PV cell or module, and further points out that the claimed species diverge significantly in structure. A serious burden would certainly be present.

The requirement is still deemed proper and is therefore made FINAL.

Claim Objections

2. Claims 1, 5, and 8 are objected to because of the following informalities:
 - a. In claim 1 and 5, the recitation of "(wafer 3)" in lines 2 and 3 of the claims, respectively, is improper. Inclusion of reference characters in parentheses is acceptable, but the inclusion of text in such references is not permissible.
 - b. In claim 8 at line 3, the word "centre" is recited. The spelling "center" is preferred in American English.Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 1753

4. Claims 1-5 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation of "in particular for contacting at least one surface of a photovoltaic element" renders the claim indefinite, since it is unclear whether the electrode is required to contact a photovoltaic element.

5. Claims 2-5 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims require a second terminal bar (22) connected to the second plurality of wires (5"). Nowhere in the specification is terminal bar 22 disclosed as being connected to wires 5" as claimed in claim 2 (i.e. wires 5" positioned between film 10 and wires 5', with wires 5' and 5" forming a mesh and terminal bar 20 being connected to wires 5') In Figures 7 and 8, and the associated text on page 10, lines 3-25, terminal bar 22 is connected to a different electrode than wires 5' of the claims. Similarly, there is no disclosure of terminal bars 20 and 22 being electrically connected to each other, as required in claim 3. The Examiner suggests deletion of these reference characters.

6. Claims 4 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The use of parentheses in the term "bar(s)" in line 2

Art Unit: 1753

of claim 4 and line 1 of claim 5 makes it unclear whether the limitations apply to both recited terminal bars. Removal of the parentheses is recommended.

7. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. There is no antecedent basis for "the contour" recited in line 3 of the claim. The claim is treated herein as requiring the terminal bars to be disposed outside the area of a photovoltaic element. In addition, the limitation, "wherein the terminal bar(s) are provided at opposite ends of the wires of the first or of the first and second pluralities of wires" is unclear, since it is unclear what structure would be described by "wherein the terminal bar(s) are provided at opposite ends of the first and second pluralities of wires", since the first and second pluralities of wires are clearly required to extend in different directions. Any configuration with terminal bars disposed in a way that can be described as "opposite" each other while in contact with the wires of the claims is considered as reading on this claim.

8. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what limitation is intended by reference to figure 16 in line 6 of the claim. Generally, reference to figures in the language of claims is not permitted. Note MPEP §2173.05(s).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1753

12. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Little in view of Shiotsuka et al. (EP 0 807 980 A2)

Little discloses an electrode in a photovoltaic element (Figures) comprising an electrically insulating optically transparent film (34), an adhesive layer (AR coating on surface 32; Column 7, lines 6-32) provided on a surface of the film, a first plurality of parallel electrically conductive wires (24) embedded in the adhesive layer (Column 7, line 6 - Column 8, line 25), a part of the surfaces of these wires protruding from the adhesive layer (Figures 9 and 10 - necessary for contact to the cell), wherein the wires are connected to a first terminal bar. (Figures 4 and 5, interconnect 70; Column 9, line 53 - Column 10, line 30; wires are connected through buses 28)

Relevant to claim 2, Little also discloses a second plurality of wires (28) running parallel to each other and disposed between the transparent film (34) and wires (24) of the first plurality. (Figure 11; Column 10, lines 39-62) Wires 28 and 24 form a mesh, and wires of the second plurality are connected to another terminal bar (70). (Column 10, lines 27-30 - each bus is provided with an interconnect structure)

Relevant to claim 3, the terminal bars (70) that are connected to parallel bus bars 28 in Little et al are electrically connected to each other through wires 24.

Relevant to claim 4, the terminal bars are connected to the respective ends of each bus bar 28. (Column 10, lines 2-30; Figures 4 and 5)

Relevant to claim 5, in the embodiments with multiple bus bars 28 (e.g. Figure 1), the interconnects 70 connected to the outermost bus bars 28 can be described as being

provided at opposite ends of the wires 24. Interconnects 70 are clearly provided "outside the contour" of the photovoltaic element.

Little does not explicitly disclose a low melting alloy coating provided on the surface of the first plurality of wires.

Shiotsuka et al teach that it is conventional in the photovoltaic art to connect electrodes to bus bars using solder. (Page 2, lines 28-33)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the electrode of Little by connecting wires 24 to busbars 28 using solder, as taught by Shiotsuka et al, because it would have provided a simple means of securing solid electrical connection and maintaining the desired spatial relationship of the wires and buses. Since conventional solders comprise low-melting alloys, such as Pb/Sn, such modification meets the limitations of the claims.

13. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nath et al in view of Ichinose et al.

Nath et al disclose an electrode in a photovoltaic element (Figures) comprising an electrically insulating optically transparent film (e.g. Figure 1C, layers 25a, 25c, 25e, or 25g), an adhesive layer (Thermoplastic; Column 5, line 62 - Column 6, line 19) provided on a surface of the film, a first plurality of parallel electrically conductive wires (24) embedded in the adhesive layer (Figures 1A-1D; Column 5, lines 8-20; after the lamination process, the adhesive 25b surrounds glass fiber 25a, and wires 24 will be embedded therein), a part of the surfaces of these wires protruding from the adhesive

Art Unit: 1753

layer (Inherently necessary for contact to the cell), wherein the wires are connected to a first terminal bar. (e.g. busbars 27 at either end of the cell shown in Figure 1B read on "terminal bars")

Relevant to claim 2, Nath et al also disclose a second plurality of wires (Internal busbars 27) running parallel to each other and disposed between the transparent film (34) and wires (24) of the first plurality. (Column 5, lines 8-16; in the embodiment where wires are used, one of the other of wires 24 and 27 must be disposed between the film and the other wire - either would be obvious to place in this position) Wires 27 and 24 form a mesh (Figure 1B), and wires of the second plurality are connected to another terminal bar. (e.g. busbars 27 at either end of the cell shown in Figure 1B read on "terminal bars", and are connected to the other busbars 27 through wires 24)

Relevant to claim 3, all wires/terminal bars shown in Figure 1B are electrically connected to each other.

Relevant to claim 4, the terminal bars are connected to the respective ends of each bus bar 28. (Column 10, lines 2-30; Figures 4 and 5)

Nath et al do not explicitly disclose a low melting alloy coating provided on the surface of the first plurality of wires.

Ichinose et al teach coating electrode wires in photovoltaic cells with conductive anti-corrosion films, such as silver-palladium alloy. (Column 9, lines 35-44)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the electrode of Nath et al by providing it with an anti-corrosion silver-palladium alloy film, as taught by Ichinose et al, because prevention or

Art Unit: 1753

reduction of corrosion would have been expected to increase the useful lifetime of the cells. Since a silver-palladium alloy has a lower melting point than numerous other materials (e.g. pure palladium), it reads on a broadly recited "alloy with a low melting point" in the absence of a definition of what is considered a low melting point.

Allowable Subject Matter

14. Claim 8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter:

None of the prior art of record teaches or fairly suggests the structure defined by the limitations of claim 8. Series interconnection of photovoltaic cells has generally been accomplished by direct connection of the front electrode of one cell to the back electrode of an adjacent cell, without the detailed terminal bar structure claimed. There is no suggestion of the claimed "step" that disposes one half of the bar above or below a portion of an adjacent terminal bar, therefore the claim is considered to patentably distinguish above the prior art of record.

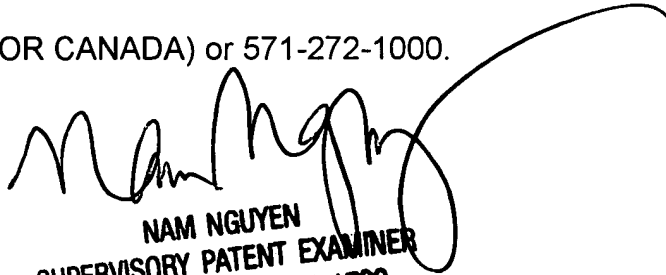
Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTB
7 August 2006


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